

The Effectiveness of a Wearable Long-Duration Therapeutic Ultrasound Device for the Post-Exercise Clearance of Lactic Acid

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Athletes performing in multiple round competitions seek rapid recovery from exercise and restoration of optimal muscle function. The increase in blood lactic acid concentration while performing intense exercise has been well documented; however interventions have not demonstrated the ability to significantly improve lactate removal beyond that of passive recovery. Low intensity therapeutic ultrasound has been previously shown to increase blood flow, fluid circulation, vasodilation, and cellular metabolism. **PURPOSE:** To determine if wearing a long-duration ultrasound therapy device on muscles can accelerate lactic acid kinetics to promote clearance from blood. **METHODS:** A randomized, double blind cross-over study utilizing a lactate-inducing circuit weight training protocol was performed by 10 male participants (22.1 ± 0.46 years). During the first visit to the lab, the 1-repetition maximum (1-RM) for each participant was estimated for the following exercises 1) lunge, 2) squat, 3) leg press, 4) leg extension, and 5) leg curl. During the next two visits participants performed two circuits of the five aforementioned lower body exercises at 70% of their 1-RM. The exercises were performed while wearing functional ultrasound devices during one visit and placebo devices during the other visit. The ultrasound devices were attached to both the quadricep and hamstring muscle groups and worn for 1 hour. Blood lactic acid was measured in duplicate at baseline as well as at 0, 2, 5, 10, 20, 40, and 60 min post-exercise. The area under the curve (AUC) of lactic acid concentration versus post-exercise time was calculated. **RESULTS:** AUC resulting from functional ultrasound devices (344.31 ± 41.12 mmol/L) was significantly lower than placebo devices (396.09 ± 35.24). Lactic acid values from functional devices at time 0, 2, and 5 min post-exercise (10.83 ± 0.8 , 10.61 ± 0.83 , 10.15 ± 0.96 mmol/L) were significantly lower than placebo respectively (12.71 ± 1.07 , 11.86 ± 0.61 , 11.69 ± 0.62 mmol/L). There were no significant differences at time-points 10-60 min post-exercise. **CONCLUSION:** These results suggest that a wearable therapeutic ultrasound device promotes blood lactic acid clearance immediately following high intensity exercise, but may offer reduced benefit later in the recovery process. Conflict of Interest Statement: ZetrOZ, Inc. is the manufacturer of the SAM® wearable long duration ultrasound therapy device and represents 3 authors on this abstract.